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NON-NUTRITIVE SWEETENERS

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What are Non-Nutritive Sweeteners?

Non-nutritive sweeteners are sweetening agents that have a higher sweetening intensity and a lower caloric content than caloric sweeteners like sucrose or corn syrup. Non-nutritive sweeteners may be derived from plants or herbs, or even sugar itself. Some artificial sweeteners are not metabolized by the body, meaning that they pass through the digestive tract, essentially unchanged.

Non-Nutritive Sweeteners and Safety: Most non-nutritive sweeteners in the United States are regulated by the Food and Drug Administration (FDA) as food additives. In 1906, Congress passed a law regulating all food additives, and in 1958, it passed a food additives safety amendment requiring safety to be proven on the basis of scientific evidence. These food additives may be granted the status of Generally Recognized As Safe (GRAS).

Several different types of non-nutritive sweeteners on the market.
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The review process from the FDA for non-nutritive sweeteners considers short- and long-term toxicity, carcinogenicity, and reproduce toxicity studies. The main factor in the evaluation of the safety of a food additive is the relationship between its probable human intake from use in food to the level where negative effects are observed. Acceptable daily intakes (ADIs) and estimated daily intakes (EDIs) guide decisions about safe consumption levels.

Types of Non-Nutritive Sweeteners

The first non-nutritive sweetener discovered was saccharin in 1878. From 1970 to 1981, saccharin was the only non-nutritive sweetener available in the United States. After almost 100 years of use in 1972, it was removed from the GRAS list based on findings from a Canadian study linking the sweetener to bladder cancer in rats. Additional studies later determined that the bladder tumors in rats were not relevant to humans, and human epidemiology studies have shown no consistent evidence that saccharin use has increased rates of bladder cancer. In 2000, legislation was passed repealing the warning label requirement for saccharin.

Since 2019, the FDA in the United States has approved eight non-nutritive sweeteners. These include aspartame, acesulfame potassium, luo han guo (monk) fruit extract, neotame, saccharin, stevia, sucralose, and advantame (see **Chart 1**).

Chart 1: Types of Non-Nutritive Sweeteners

Non-nutritive Sweetener	Brand Name	Description
Chemically produced		
Acesulfame potassium	Sunett® and Sweet One®	Usually used in combination with other non-nutritive sweeteners Frequently found in sugar-free sodas
Neotame		7,000 to 13,000 times sweeter than sugar Used in low-calorie foods and beverages
Saccharin	Sweet 'N Low®, Sweet Twin®, and Sugar Twin®	Oldest artificial sweetener on the market 200 to 700 times sweeter than table sugar
Sucralose	Splenda® and Equal Sucralose	Used as an alternative for sugar in cooking and baking Used in many low-calorie foods and beverages
Advantame		Newest non-nutritive sweetener approved by the FDA 20,000 time sweeter than sugar Not commonly used at this time
Aspartame	Equal® or NutraSweet®	200 times sweeter than table sugar Used in a variety of foods and beverages such as cereals, yogurt, candy, diet sodas, and other products
Naturally Produced		
Stevia	Truvia®, Stevia in the Raw®, SweetLeaf® Sweet Drops™, Sun Crystals®, and PureVia®	Extracted from the leaves of the stevia plant (native to South America) Used in a wide range of foods and beverages or a tabletop sweetener
Luo han guo	Monk Fruit in the Raw ®	Made from crushed monk fruit New non-nutritive sweetener on the market Used in China for almost 1,000 years

Non-Nutritive Sweeteners and Diabetes

In addition to some controversy over the safety of non-nutritive sweeteners, there are other questions related to the benefits of these low-calorie sweeteners, especially for individuals who have diabetes. The use of non-nutritive sweeteners has the potential to reduce the overall caloric and carbohydrate intake if they are substituted for caloric sweeteners. Non-nutritive sweeteners may influence health outcomes in people with diabetes by improving glycemic control and weight management. Non-nutritive sweeteners have few or no calories, compared with about 16 calories in 1 teaspoon (4 grams) of sugar.

To Sweeten or Not to Sweeten?

Overall, non-nutritive sweeteners listed on the GRAS list are considered safe to consume within moderation for most individuals. The FDA-approved sugar substitutes are considered safe in the amounts people usually drink and eat. However, there is inconsistency in dietary recommendations for consumption across different health organizations. Some individuals with certain medical conditions, such as phenylketonuria (PKU), should avoid certain non-nutritive sweeteners. If you have specific questions about which sweeteners are safe for you, you should consult your physician. In general, people

are encouraged to decrease both sweetened and non-nutritive sweetened beverages and use other alternatives such as water.

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Author(s)

Danielle McFall, Extension Associate, Field Operations, Clemson University
Carley Mahanna, (PHS Student) UPIC Intern Experiential Education, Clemson University

Clemson Cooperative Extension | 103 Barre Hall Clemson, SC 29634
864-986-4310 | **1-888-656-9988** (SC residents only) | HGIC@clemson.edu